The JOURNAL *of* GEOGRAPHY

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VOLUME XLV MAY, 1946 NUMBER 5

GEOGRAPHY IN A WORLD OF MOTION

HENRY J. WARMAN
Clark University

If the urge to study global or world geography has accomplished anything at all we must accept the fact that it has caused all geographers to pause and size up the geography pattern as a whole. Buried underneath the mass of details usually required on each grade level, submerged in a sea of records and testing, and enslaved to the task of meeting city, state and continental standards and mileposts, geography teachers seldom get the opportunity to look up at the major concepts of geography, emerge from the paper work, and renew acquaintance with the fundamental truths of geography and the part they play in a moving world.

When that acquaintance is renewed some startling, but inevitable, discoveries will be made. As General Washington would be astonished at the discussions taking place at one of General Eisenhower's staff meetings, or as Robert Fulton would be speechless at one of Henry Kaiser's board meetings, so it would be with the geography teachers who might have neglected to adjust the aims and techniques of their teaching to the modern era. Fortunately, most teachers of geography in our country today are aware of the changes about them, and are striving to keep abreast of the tidal wave of global geography which is sweeping the country. Evidence for the above statement is not lacking.

Many teachers are bombarding book companies, teachers' institutes, colleges and universities with requests for textbooks, courses of study, and related materials to meet the demand for world geography courses. When such a strong demand arises it is time for careful consideration of the ends as well as the means. May I suggest what may be a similar situation?

Our forefathers in America deemed it essential that their children be schooled in certain fundamental subjects. Their unwritten, in many cases, but nevertheless, heartfelt desire was to have a

better society in our young, growing democracy—an educated democracy. The courses of study were not too rigidly outlined. No one reader, no single arithmetic book, no nationwide speller have ever been prescribed, nor even accepted. But the aim of a literate group of people, acquainted with the tools for a better every-day life was there always.

Might we today follow along the same general lines of procedure? If we are agreed to a large extent on certain major concepts for global geography, keeping them before us instead of desperately seeking for the "global textbook of all global textbooks," we will have taken a long step forward in accomplishing what geography has within its grasp to do.

Geography—A "Dead" Subject?

Today we are brought sharply face to face with these words, "a moving world." Too many times our geography has dealt with the location factor, but we have used that factor only to "fix" places. There is no attempt on my part to deny that this is important, but it is only the beginning; the very words a "moving world" give us our clue. Are we to be content in acquiescing to the "dead" title, so often applied to Latin and Greek, being affixed to geography? If this occurs our field will be hurt immeasurably. It is my contention that the time has arrived for us to have "moving geographers" in this "moving world." The implication is clear. These moving geographers must do more field work, but such is not my major plea. They must move mentally by gearing their teaching to a moving world. Here is the essence of the geography of a global or world nature. Action, speed, dynamic activity—the modern world is rife with it. The geographer today has the greatest opportunity of his career to realize the largest results in his field, and an appreciation of it by holding before him the concept of geographic movements and their significance to the modern youth.

Some may say, "What new movements are taking place today that are of such great significance that reorganization and new modes of attack are essential?" The mass movements of people, of armed men, prisoners of war, refugees, the rapid change of news and ideas are all worthy of scrutiny. The hungry eyes of people in conquered countries tell us a story. This story is not only of hunger for food and drink, but of a hungry search for the happiness, the assurance, the success as epitomized by our gallant men swinging along thru the Arc de Triomphe—hunger for the

ideas of democratic living, for the "know-how" ability, and for the trait of gregariousness displayed by so many American youths. Yes, the movement and transplanting of ideas continues, but the pace is accelerating.

Another movement that may be pointed out is that of diseases and medical knowledge. With the tremendous dislocations of people there follow diseases, plagues, and epidemics. The spread of medicine and medical skill fit well in our concepts of a moving society.

An outstanding example of the changing pattern of our lives lies in the aviation programs of our country. Under the press of war we stressed training in our schools in such subjects as preflight aeronautics, meteorology, aerodynamics; we induced the scientifically, academically minded student to pursue these studies. Even in so short a time as four years our aviation training ideas have changed. Civil Aviation authorities today are concerned with the social aspects of flying, with the factor of safety, and the need for a general training rather than a specific one for the great mass of potential flyers. The number of flying aspirants has increased enormously and they will not be denied. Geography has spread no less fast. A prescribed, cut and dried global geography course should not be our sole objective under the present circumstances, but a re-evaluation of the concepts of geography should be paramount.

GEOGRAPHY—A LIVE SUBJECT!

Today, the most vital thoughts that a person who studies or teaches geography from the global or world standpoint may have, or should have, are connected with the factor of movement. The world does not stand still. It revolves around the sun, it rotates on its axis, it travels with the rest of the Solar System thru space at a terrific speed. At this starting point the global geography teacher accepts the modern challenge, "Are you a geography 'fixer'? Do you put all geography items into neat little pigeon holes of memory? Or do you, at the very first instance, launch on the ever-changing, never resting voyage thru geography in a moving world?" The air that surrounds the earth is in continual motion. The oceans surge upon the shores, the tides vary in their height, the waves toss boats about on their white crests. The lakes are being ever filled by the streams and creeks; the ocean is being fed by the great rivers. Moving, to and fro, surging, up and down—these are the thoughts that should come into the mind of the

present-day geography pupil when he looks at the world as a whole. Are we teachers nurturing these thoughts?

MAN-MADE MOVEMENT

The story is not yet complete. It is far from complete. For movement, as you and I know it, is much more visible in the actions of people as they move about in their daily work and play. We also see man-made machines cross and recross this entire planet. Canals connect the water bodies, tunnels connect valleys, bridges connect banks of rivers, and the human patterns, aided thereby, continue to be moved and removed from place to place.

On the vast expanse of the oceans and seas are vessels of all kinds; the mighty "Queens," the deadly dreadnaughts, the sleek destroyers, the slow Liberty ships, and the battered tramp steamers, all add to the seemingly endless movement.

On land the picture is the same. Streamlined passenger trains race in daylight across farm land, thru cities and suburbs; at night the long fingers of their searchlight beams penetrate the darkness and the trains leap after them. Less direct in their movements but greater in their numbers are the automobiles and trucks that roll over the land surface of this earth. In some places the earth abounds with movements of this kind,—mechanized movements; but in many places animals are the beasts of burden, and often man himself is the moving and the mover.

Movement, the pressing factor of the present world era, is more evident and more easily recognized today than ever before. We are more readily impressed today than our ancestors were. The explanation lies partly in the fact that we see movements taking place today at a terrific rate,—an almost breathtaking pace.

We were always dimly aware of the earth's motions—sunlight and darkness, changes of the seasons. We have endeavored to account for the changes in the atmosphere, the coming of "warm fronts," "cold fronts," hurricanes, tornadoes or typhoons. Today more than ever before we see man-caused movement—and the most striking feature of that movement to the geographer should be that it is taking place on an earth that is moving, on land that is being worn down by water, on rivers and streams that are racing toward their outlets, thru the ever restless air which surrounds our planet. It is this last phase of movement which has brought us to realize what a going world this is in which we live. Here, if ever,

is the opportunity to show a living, breathing, active human being in relation to his non-stationary environment.

Imagine yourself somewhere in space looking at this old earth of ours. Planes, swift planes, flying hither and yon, thru an atmosphere which is never at rest; boats big and small, plying their way thru never still seas; trains, cars, animals and people crossing the land masses lighted by the sun or drenched by rain,—all these impress us today with that great modern factor of world or global geography—movement. A static geography is untenable when approached with this concept in mind.

WHAT TO DO ABOUT IT

In an era of fast living, such as we have today, there are times when we stop to consider many details about it. Why are there great movements of people? Is there anything of permanence and stability on our planet? Are all people driven to migrate or to trade by the same desires? Is there any one thing that affects all the people on the earth? The geographer can teach the patterns of population, crops, mineral distribution and the like. Is it possible to see patterns of likeness among the peoples in various places on the earth? How can we obtain a world viewpoint? How can we better understand our fellow earth-inhabitants? What can we set down as fundamental, as a truth, a belief, a firm base upon which to view our moving world and search for the reasons underlying all its movements?

To do just that and no more will lead eventually to geography's relegation as an elementary, encyclopedic subject. To make it dynamic, to foster its growth, and to raise the level of esteem which it now has is the responsibility of the geographers today.

We do not have to administer a life-giving injection to the field of geography. The elements of life are there. We must bring out and lay stress on the dynamic aspects of our own field. We can do it best by acquiring a fresh concept of movement in our present-day geography. Movement of the air and its unity, movement of the seas and the world ocean, lands linked by trade movements, exchange of surplus products, and now the imparting of ideas and ideals; all these opportunities, the geographers' opportunities, stand before us. We should seek the best teaching aides to realize these opportunities.

If geography teachers and students are to achieve the most

from global or world geography there must be ever present the concept of growth which implies movement. It has been inherent always. We have regarded geography in many phases,—a study of the community, then of the homeland, on and on to the continents, and now our horizons are to be widened to a world size.

We should not lose sight of these widened horizons by immersing ourselves in a sea of facts. Perhaps we have been burdened by the routine and details of the subject matter. If so, we geography teachers and students should about face and firmly resolve that, starting tomorrow morning, we shall step out of our front doors into a turbulent atmosphere, on a living earth, and walk or ride to our appointed positions, thru a stream of humanity and a maze of mechanized vehicles to teach the geographic factors and facts of a global, moving world. The concept of movement will not be denied. Why do we ignore it?

PUERTO RICO*

An Interpretation

WILLIAM H. HAAS
Professor Emeritus, Northwestern University

Puerto Rico is a small island with an area of only 3,400 square, miles, all parts well within a half day's journey by auto from the capital, San Juan. The island's significance to us, however, is far out of proportion to what its size may suggest. Our taking it during the Spanish war of 1898 was not a very costly venture, but, as in the case of some private affairs, it's not the original cost but the upkeep that need worry us. We have already spent millions and the end is not yet. The island also has brought on many a troublesome political headache, for as a whole, the Puerto Ricans have not been very happy under our rule. According to the old mercantilist theory, colonies existed only to make the mother country self-sufficient and rich. In this case the situation is reversed. Only a rich mother country can afford to do what we have found necessary. England also to its sorrow, has found this old theory unworkable, and within the last century has begun to build its empire upon another foundation. What should be our attitude?

* Presented November 25, 1945, before the Indiana State Teachers Association Geographic Section.

Puerto Rico is a small country, but large in population; even at the time of the transfer in 1898 the island held more people than it could support on a decent American standard. There were then nearly a million people on the island, or 280 for every square mile of territory. By 1940 the population had practically doubled with 556 people per square mile—against a density of only 96 for Cuba. It is true that American activities have added to the general welfare, but they have not penetrated deeply. As late as 1943 with the huge expenditures for war going on in the island, about half the workmen were registered as wanting work. What makes the situation all the

Fig. 1. Plain along the coast with barren hills farther inland. Cane in the foreground with worker's home near the base of the hill slope.

more serious is that the rate of increase for each decade shows an advance and the death rate a decrease. Emigration can alleviate but cannot change the outlook. Already some 45,000 Puerto Ricans are in New York, a second Harlem, under conditions which are pathetically bad. A move to resettle some in the Amazon Valley came to nought as the commission decided that it would take $500 per family, as a minimum in the new set up.

The physical environment for a limited number of people is on the whole favorable. The island setting is beautiful. Only the people make ugly sores. The climate has no extremes. Monthly average temperatures are in the seventies thruout the year and frost is unknown. Being within the trade wind belt there is always a cooling breeze and the nights are comfortable. The windward slopes

have more, the lee slopes less rain. Some areas are pure desert with small irrigated areas as in the southwest about Ponce and in the Isabella district farther north. The streams, of course, are short and the run-off rapid without natural storage. The island as a part of a partially submerged mountain chain is hilly except along the coast where subsidences and elevations have given a complex series of terraces and plains. The best lands, therefore, are near the sea with a sharp increase in elevations a few miles inland. There are a few rich limestone valleys in the interior, each with varying widths. The maximum altitude is a little less than 5000 feet. But by no means is all the land of cultural value. The land in crops including hill slopes too steep except for hoe cultivation is listed as 38 per cent of the total.

Fig. 2. A village along the south coast having a better type of house.

The standard of living for the masses is deplorable, in fact intolerable as a part of the American commonwealth. The late Theodore Roosevelt, Jr., when governor of the island said in his report that "the island seethes with misery" and this is not an exaggeration. The death rate for tuberculosis is five times that of the United States. In the rural districts 90 per cent of the people are infected with hookworm. Malaria affects from one-fourth to one-half of the people in the coastal areas. There are only 477 doctors for the two million people. Yet there is nothing new here, nothing different from the islands under British, French or Dutch rule. The problem of all is basically the same, an economic one. There is not enough to go around. What is said of Puerto Rico has its duplicates in others. The misery to be found is only that in contrast to the general standard in the United States. Already do we hear a renewed agitation not to forgive war and rehabilitation debts, but

demand the handing over of these Caribbean possessions as compensation. Perhaps if these nations can afford the luxury of their upkeep thay can afford to pay off their lend-lease. But even as an outright gift, it should be clear that these islands would become for us an economic and social liability. Not a single one is able to feed itself well and import in some cases is as much as nine times that of the export. Socially, the standards of the islands are unbelievably low and necessarily so under the housing conditions prevailing.

Fig. 3. A hut made almost entirely of straw placed on truck to be used in a parade in an appeal to the governor for better housing.

Illegitimacy, social diseases, illiteracy, are the rule. Three out of four people in Puerto Rico, Governor Tugwell states, are "ill-fed, ill-clothed and ill-housed."

In spite of the hundreds of millions spent in Puerto Rico there is still much to be ashamed of, for Puerto Ricans are American citizens and sitting on our own front door step. There is much dissatisfaction with American rule, in part, legitimately so. But we had a bad start. In February 1898, six days before the sinking of the battleship *Maine* in Havana harbor, Spain granted Puerto Rico her *Carta Autonomica,* nominal independence. Two months later the United States declared war on Spain which, of course, included Puerto Rico also, an innocent bystander. In October, came the political transfer. All came within a short ten months period, so quickly that the people scarcely were conscious that they now had to change their allegiance. Of the ceremonial transfer a Puerto Rican leader has said: "The breeze that unfurled the American flag that day blew liberty from the island." In their Congress a

speaker rarely refers to this country as the United States, but as Washington, Wall Street, or simply as the *invador,* the invader. There has come, however, with the years a more cordial feeling. Many who once talked independence, now are less certain or definitely opposed to such a movement. For some years the United States has claimed the whole Caribbean area as its special "Sphere of Influence," and other nations have accepted this assumption. If we take on freely such a military responsibility, should we not

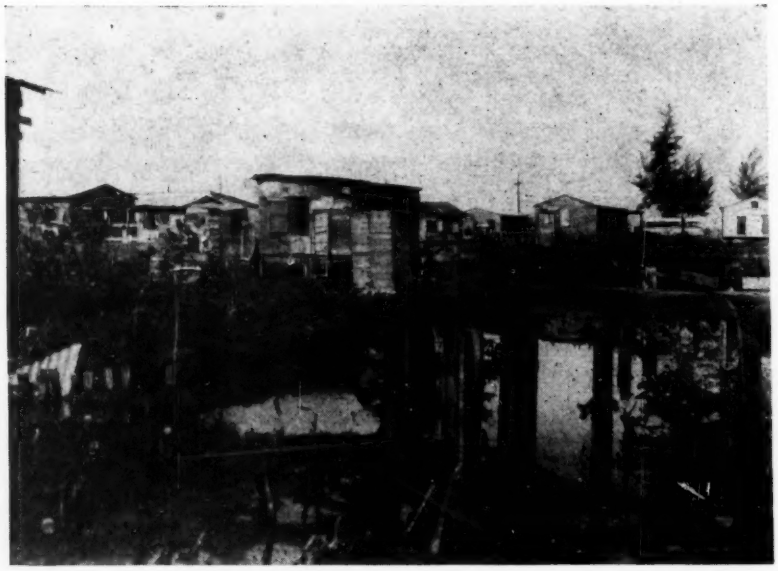

Fig. 4. Homes on the tidal flats of the Rio Piedras not far from the University.

also do so politically, economically, and even socially? A British writer seems to think so.

We have had control over Puerto Rico for nearly fifty years, in contrast to the British, French, and Dutch control for approximately 200 years. In comparison our record shows up well. We have been extremely generous. All taxes are left on the island and no tax support is given to the Federal Government. There is no income tax. Excise taxes are left on the island or returned, of which in 1944 the liquor tax alone was $25,000,000. All products of course come to the United States free of duty, and during the depression years the Federal Government distributed some $68,000,000 in direct relief. Our per capita health expenditures on the island are four times our own, and yet typhoid, hookworm and

other filth diseases are common. Not including Cuba, more money is spent for public health in Puerto Rico than on all the other islands together, yet water in small towns and rural sections is never safe to drink. Illiteracy has been cut from 70 to 30 per cent yet many children do not see the inside of a school because none is available for them. During the period of occupation the birth rate has increased from 25 to 39 per thousand, adding to the present overcrowded crop land annually 30,000 more mouths to feed. At the same time the health service has reduced the death rate from 37 to 18 per thousand as against 10.8 for the United States.

The population increase here has especial significance when compared to productivity. This relationship is difficult to analyze as there are so many factors involved. However, the Puerto Rican Planning Board is inclined to the belief that between 1910 and 1940 productivity has kept abreast with the population. But this does not mean that this increased productivity has been felt by all. In a recent study of 2000 representative families the average income per family per year was about $341.00. More than half of what the island eats is imported—rice from Louisiana, beans from California, dried cod from New England and Canada—at American prices plus high freight rates. The marked lack of opportunity for young people to establish themselves gainfully has led to a general state of discouragement and apathy, even among the most energetic. The most serious problems, therefore, in Puerto Rico may be analyzed into three broad elements which interact on each other in cause and effect—overpopulation, poverty, apathy.

THE OUTLOOK

All friends of Puerto Rico want the people to be as independent and responsible for their own future as possible. This authority and responsibility has never been granted. They have had limited powers in self government, but there has never been an official representative in Congress. During Spanish times the island did have a representative in the Spanish Cortez. Why, at the close of the war, Puerto Rico was not given a limited independence like Cuba, is not altogether clear. Cuba's treatment has been distinctly superior. The major question is, of course, how far do our responsibilities go? Should the relationship be like that to a state or territory within the union? Or independent, a part of our general

"good neighbor" policy? To grant independence would mean the exclusion of free entry for sugar, unless for special concessions as granted to Cuba. Excise taxes no longer would be returned and all other aid cut off. This would save the United States many millions in money annually but might be disastrous for Puerto Rico. To grant statehood would satisfy the political longing of the more sensitive. They would then feel as real Americans not as being owned by the United States. Too many Americans, even teachers, still speak of our outlying territories as possessions, not as an integral part of the United States. As one prominent Puerto Rican said: "I once thought of myself as a loyal Spaniard, now I am just a third-rate American." Another possibility is the retention of the present status with an ever increasing autonomy, similar to a Dominion status like that of Canada to the British Commonwealth. This autonomy would satisfy the political aspirations of all but the most radical, and in time make the island more self reliant and less dependent. The official status should be made clear at the earliest possible moment. President Truman has urged this on Congress.

Much of the land in commercial crops, especially in sugar, is company owned and the profits go to a very small minority, some of it out of the island altogether. The vast majority of the rural population are landless laborers who work at low wages when work is available. Only a few of these have the privilege of growing their own foodstuffs. As a sugar official said, "The land is too valuable for a *jíbaro* to putter round in." Without minerals it can be safely assumed that agriculture will always be the backbone of the island's economy. Any amelioration or improvement of conditions therefore must rest on the more efficient use of the land. This is possible thru fertilization, better seed control, adaptation of crop to soil and slope, and the introduction of farm machinery to release pasture lands now needed for forage for draft animals. To base the economy on other things than sugar is not feasible as no other land-use yields so high a reward, either in money or services. Sugar, however, is dependent on the free market of the mainland. To meet the tariff rates as an independent country would be impossible. Therefore, to insist on unrestricted independence would be national suicide as the entire economy would have to be reorganized. Sugar is vital as there is nothing that can economically replace it.

Almost the entire population gets its support from the soil, but each year each square mile has ten more people to support. Intensification, no matter how efficient, cannot be extended indefinitely. Food production cannot keep up with the population increase. Of the million acres of crop land for the two million people only 28 per cent is of a quality that gives it a profitable crop value. It is to be remembered that in the four centuries of indifferent cropping and land abuse, much of the land is necessarily of a very low order. The adding of fertilizers is expensive and their use by the masses is practically unknown. As nearly seventy per cent of the total land area is subject to sheet wash, the steep-slope hoe-crops suffer particularly. The crop problems are further complicated by seasons of drought, heavy tropical rains, and above all by the hurricanes which raze parts of the island on the average of once every five years. It is difficult for an outsider to appreciate the calamity which befalls a community with the passage of one of these terrific storms. They practically limit the island to non-tree crops, and suggestions have been made to put a greater percentage of the food crops under ground. There need be also some redistribution of crops. Coffee occupies the western interior hill country generally on moderately thin soils. Due chiefly to hurricanes and competition, the coffee regions generally have degenerated into blighted and bankrupt areas. Some of this land could be used more profitably in other crops. Tobacco, once very important and profitable, has hit the toboggan also in this cigarette age. Of the commercial crops sugar is the only pronounced success.

Any long range planning must necessarily be under a directed agriculture. Where the rural population is in such dire poverty and where initiative has counted for so little for so long, little can be gained by a purely advisory system. Goodly sums of money must be available to set such plans in motion. The local authorities are not in a position to undertake such wholesale rehabilitation. The only hope lies in the generosity of the American Government. Much already has been initiated under the direction of the Puerto Rico Planning, Urbanizing, and Zoning Board to which this paper is indebted chiefly for the data used. This Board has been set up to study and guide future development. A system of low-cost housing already has been initiated, attempts made at land redistribution, a budgeting system established, the tax system modernized, attempts at the improvement of the water supply, a

social security system organized, group hospitalization made possible, educational reforms, and a host of other directives. One of the most important of these has been the establishment of the Puerto Rican Development Company to plan a program of industrialization. Private capital has hesitated in starting untried industries, but will do so, it is believed, with the encouragement and aid, and the sharing of risks by this organization. Any worthwhile industrial development must center around low fuel consumption and relatively large users of labor. Under these requirements have come the making of wall board from "begasse" to replace the large imports of lumber, the making of the cheaper cottons and the manufacture of work clothes to utilize home grown cotton, a cheap line of utility shoes, meat packing, and the utilization of the by-products. The possibilities seem good. But there is a dearth of skilled labor so the growth will necessarily be slow. To hasten this a group of promising young graduates are now studying in Massachusetts Institute of Technology. The lack of available capital to carry on the work is the great hampering element.

Yet all this planning is for amelioration only, unless the population can be kept on an even keel or even decreased. Estimates of 4,000,000 people by 1960 make planners feel "what's the use?" Unfortunately, the church for the most part, is bitterly opposed to any form of birth control, and a national law forbids the dissemination of knowledge to this end. Yet a Federal court has approved a local law permitting this in case health conditions demand. This is open, fortunately, to a wide interpretation in a land where there is so much misery. This work was inaugurated in 1939 by a private welfare agency and is now under the Bureau of Maternal and Infant Welfare, Department of Health. The work has been somewhat restricted thru general ignorance of its purpose, and the lack of funds. Yet already in 1942 the number of mothers advised rose to over 80,000, and the numbers served since has been rising regularly at a cost of less than $10 per patient. Fully 200,000 families need some direction, especially instruction, as the ignorance in sex matters of the masses is appalling. Should the approximate costs of these clinics rise to $2,000,000 annually for the stabilization of the population and the attendant increase in health and the decrease in misery, the dividends on such an investment would be boundless. When ten or more people of both sexes are forced to live and sleep in one room, there is naturally

great promiscuity, and births even in very young girls is a foregone conclusion. Whatever the plans followed the birth rate must be reduced if a cancerous condition is to be remedied. Money and more money is needed and fewer and still fewer births wanted.

EDITORIAL NOTES AND NEWS

The April issue of the JOURNAL carried a list of members of the National Council of Geography Teachers, as the names appeared on our February mailing list. Errors are certain to occur in the preparation of such a long list since the list changes monthly, and since thousands subscribe for the JOURNAL, without becoming members. If you are a member you should have a membership certificate and the letters MNC should appear on the address label of your JOURNAL. Will you please check these items and let us know if any errors exist. If you subscribed thru a magazine agency you *did not* become a member of the National Council, as agents do not handle membership dues. Your annual dues of $3.00 should be sent directly to the JOURNAL indicating that they are dues in the National Council. We will appreciate your cooperation.

DR. FLOYD F. CUNNINGHAM, past-president of the National Council of Geography Teachers, is with the Lecture Bureau of the Information and Education Division of the army now in Germany. His work has taken him to many parts of Germany where his geographical lectures are to American troops. He expects to return in June.

According to the March, 1946, issue of the *Geography News Bulletin* of the Department of Geography of the University of Pittsburgh, Zoe Thralls and Elsie Hoper were recently honored at a dinner sponsored by the Geography Club. A number of educators paid fitting tribute to these women for their years of professional activity in the promotion of geography in education. Friends of Mrs. Erna Grassmuck Gilland will be glad to know that she was able to attend this recognition dinner, following her long illness.

PAUL H. KINSEL is the director of the N.E.A. Travel Service. His graduate work was done in the geography department of Washington University at St. Louis, which is headed by Lewis F. Thomas. This Travel Service is sponsoring several tours to Mexico, and has a regional vacation center in New Mexico, and another in North Carolina.

IRON AND STEEL: A HIGH SCHOOL UNIT IN WORLD GEOGRAPHY

ELIZABETH S. LICHTON
Waller High School, Chicago, Illinois

The following is the writer's "blueprint" plan. The explanations, questions and exercises appear in the sequence in which they actually occur in the teaching procedure. It was written concurrently as it was taught in the classroom at Waller High School, Chicago, during January, 1946, and is the elaboration of the same Iron and Steel unit as outlined by the same author in the February, 1945, JOURNAL.

PART I. INTRODUCTION

A. *The Importance of Iron and Steel in Our Lives*

Next to agriculture, manufacturing employs more people in the world than any other occupation, and of all manufacturing, the making of iron and steel is by far the most important. It is easy to see why this is true.

Most of the tools and machinery used to make other manufactured goods are made of iron or steel, so that iron and steel manufacturing is basic to all manufacturing. But for a very few examples of a primitive type, such as clay pottery fashioned with a stick or reed baskets woven by hand, it is difficult to think of any manufactured article which had not utilized some iron or steel implement in its making. The looms of the textile mills, the sewing machines of the garment shops, the buzz saws of the lumber mills, and the mixing equipment of the bakeries are but a few examples of hundreds of thousands of different kinds of steel machinery.

B. *Steel and Man's Progress*

The stages of advance in man are closely related to the invention and development of the iron and steel industry, for even the wheel which changed man's method of work more than any other early invention did not reach its heights of usefulness until made of steel.

C. *Steel and Our Modern Life*

We could not lead the kind of lives we do in a modern industrial nation were it not for iron and steel. Steel is used for:

1. Modern construction, buildings, bridges, tunnels, etc.
2. Modern transportation, locomotives, automobiles, boats, planes, etc.

3. Modern communications
4. Electrical power produced by generators to move the wheels of industry
5. Sanitary, plumbing, heating equipment
6. Surgical instruments to save lives
7. Modern implements of warfare to safeguard our interests

D. *Steel, the "barometer" of business*

Because of its vital function, sales of steel have come to be an indication of the tempo of production and sales in other commodities and of the general prosperity of the country as a whole.

PART II. MAKING IRON AND STEEL

A. *Iron and Steel Terms—Their Meanings*

Look up in advance, the meanings of the following terms in order that you may better understand subsequent discussions. After class discussion you should have something like the following in your notebooks.

1. Iron ore is a reddish rock just as it is found in nature. The iron in the rock is in combination. It cannot be picked out but must be melted out.
2. Coke is coal which has been heated to a tremendous temperature so as to drive off the impurities. Almost pure carbon remains which burns with a much hotter flame than coal.
3. Pig iron is the pure molten iron, unrefined and unprocessed as it pours out of the heated rock into small brick-like molds called "pigs."
4. Coke by-products are made from the gases which are piped off. Some of the gas is burned in your kitchen gas stoves. The remainder is made into a surprising array of products which show what modern chemistry can do. Dyes, perfumes, medicines, tars and the marvelous nylon thread all come from coal gas. In Chicago, the gas bills are printed: Peoples Gas Light and Coke Company. Do you now see why?
5. Steel is pig iron remelted in a tremendous cauldron combined with other ingredients and reheated in great furnaces. Special chemicals are added to produce special kinds of steels. Some steels are made elastic so as to be pulled into wires, some so as to take a high polish like stainless steel or a sharp edge like razor steel.

B. *Charging the Black Furnaces*

In the booklet,[1] *The Story of Steel,* we can get a good idea of steel making. As we follow the processes thru the pictures, it is almost as good as a real visit.

PART III. BRINGING THE RAW MATERIALS INTO GARY

A. *The Iron Ore*

1. At Hibbing. Look at the map which shows iron ore fields. One of the greatest

[1] *The Picture Story of Steel* (New York: American Iron and Steel Institute, 1937), pp. 2-41.

iron ore deposits found near Hibbing, Minnesota, is called the Mesabi. From the scale of miles you can estimate its length and width.[3] One mine which is now being operated is 2½ miles long, 1 mile wide and 350 feet deep. Imagine such an area near your school. What streets would form its boundaries? How many times the height of the school building would be its depth? This huge colored postal card from Hibbing shows the natural reddish color of the ore and the railway tracks which have been moved down eight times as the ore was removed at higher levels. Iron ore from this huge open pit is simply blasted with dynamite, lifted with steam shovels on to open cars.

2. At Duluth. The long trains of cars are pulled to the nearest lake port which has the appropriate loading equipment. From our picture collection and those in the books, you can see the marvelous equipment which makes it possible to load a great ore boat holding 10,000 tons in less than one hour.[3] Name three other lake ports from which ore is shipped.
3. Trip thru the Great Lakes. Ore boats follow the same route thru the Great Lakes as the wheat boats. They are shaped similarly too, long and narrow so as to sail thru the locks at Soo. After passing thru the Straits of Mackinac and Lake Michigan they glide into the steel mill yards at Gary.
4. Layout of the Steel Mills.[4] In this airview picture and corresponding diagram of the Steel Mills you can see how a "slip" has been cut into the yards from the lake in order to allow the ore boat to steam into the yards. Do you see the great unloading cranes? The great piles of ore, and the blast furnaces are near the slip. Can you see why? Steel mills use a lot of ground space. One story buildings which house rolling mills, coke ovens, sheet mills, bridge factories and stretches of railway tracks which carry heavy materials from one process to another shows that an efficient layout utilizes many acres.

B. *The Coal*

1. Coal Producing Areas

   We have seen where and how the iron ore is brought in, now let us see where the coal which is made into coke in the great coke ovens near the steel mills comes from.

   Look at the map which shows coal producing areas and amounts produced in the United States. These are some coal facts which we can read from the map.

   a. The one most important producing region appears to be in the great Appalachian chain and stretches from northern Pennsylvania to central Alabama.
   b. Smaller amounts are mined in Illinois and Indiana.
   c. Still smaller amounts are widely distributed thruout the great Rocky Mountain area.
2. Coal for Gary

   From which of these sources is coal obtained for the Gary mills? You might make a tentative guess that coal for Gary comes from the Illinois field and the guess would be intelligent, because it is the closest source, but when you check by reading you find that Illinois coal does not coke satisfactorily, so that a rail haul of about 500 miles is necessary to bring in coking coal from the closest Appalachian field.

[3] *Ibid.*, p. 2.

[3] Charles Colby and Alice Foster, *Economic Geography* (New York: Ginn and Co., 1944), p. 314.

[4] *Ibid.*, pp. 316-317.

3. Formation of Coal
   At this point it might be well to take a little time to find out more about coal, how it was formed, how the earth's crust buckled in places and exposed seams on the hillsides and how shafts must be sunk to reach seams in level places.
4. Grades of Coal
   The quality of coal depends upon the length of time involved in its formation and the pressure to which it was subjected. There are many grades from the anthracite of Pennsylvania to the crumbly earthy peat of Ireland.
   Did you realize that a sparkling diamond contains the same element as a piece of sooty coal? Why do some diamonds have a yellowish cast? Where are black diamonds found? How used?
5. Important Uses of Coal Other Than Coke
   a. For generating electricity
   b. For generating other steam power
   c. For heating homes and buildings
   d. For making important by-products such as gas, chemicals, nylon, tars, dyes and perfumes

PART IV. IRON AND STEEL DISTRICTS IN THE UNITED STATES

A. *Characteristics of an Iron and Steel District*

All iron and steel industrial districts are similar and readily recognized. There is very little difference in the landscape in the Gary, Pittsburgh or the Ruhr district in Germany. All are busy, crowded, smoky places. Besides the glowing furnaces, there are foundries and mills of all kinds which make articles of steel. Automobile plants, harvester works, machine shops, construction companies and miles and miles of railroad tracks make up the scene. It is a densely populated place with the closely spaced towns and cities of the workers.

B. *Principles of Location*

If a steel corporation were to build a new plant in the United States, the promoters would look for a place that possessed certain advantages so that they could do a big business and compete successfully. Such a plant would be located:

1. Where iron ore could be brought in cheaply by water.
2. Where coal need not travel too far. It is uneconomical to transport coal long distances for great amounts are needed not only in the smelters, but in the nearby factories and power plants.
3. Where there is a big nearby market for steel such as found in densely settled areas where there are many cities, factories, trains, etc.
4. Where there is an abundant labor supply such as found in urban areas.
5. Where there is a suitable site for the plant layout.
6. Where there is an abundant supply of water which is needed in the processes.

In view of the above principles, would Duluth, Minnesota be a good

place for a big iron and steel industry? Would Price, Utah?

C. *Major Iron and Steel Districts*

As we have seen, iron and steel districts are located according to reason. Let us now see where they are and from maps and readings learn some facts about each. One convenient way of putting your findings together is to fill in a table like the following:

	Chicago	Pittsburgh	Lake Erie	Eastern	Birmingham
Location					
Important Cities					
Sources of Coal					
Sources of Iron Ore					
Special Markets					
Special Advantages					
Special Disadvantages					

Part V. Map Summary

A. *Map*

An excellent way to summarize is to make a map. One can record a great deal in this convenient short hand way. A legend will make it possible for others to read the map story of steel, but you will be reminded of many additional facts and ideas which you learned in this unit. On an outline map of Eastern United States mark:

1. The iron ore deposits with deep black
2. The Appalachian coal areas with light gray
3. The five iron and steel districts with red stripes
4. The major cities with strong dots
5. The iron ore lake routes with a green line
6. The major coal routes with dotted green lines
7. Give your map an appropriate title

PART VI. TEST

I. Iron and steel manufacturing is basic to all other manufacturing. Show why this is true

II. Which *two* should you select as being most critical to modern industry?

1. Coal for coke
2. Coal for coke by-products
3. Coal for power (steam and electric)
4. Coal for heat

III. Check the *two* reasons which *best* help to explain why September is the busiest month at the Soo Canals.

1. Ore is bought in anticipation of winter needs.
2. A rush to send thru ore supplies before the lakes freeze.
3. Wheat harvest comes thru at this time, too.
4. Output of ore mines is greater in the Fall.

IV. Five desirable considerations in locating an iron and steel district are:

1. A Great Lakes position for cheap access to Superior iron ore
2. Not more than a 150 mile rail haul for coal
3. A market in nearby cities crowded with industries
4. An abundant labor supply
5. A suitable site

Which of the above conditions (use numbers) are lacking conspicuously in each of the following districts? There may be more than one.

Pittsburgh _____ Chicago _____
Eastern _____ Birmingham _____

V. Write P if true of the Pittsburgh District.
B if true of the Birmingham District.
E if true of the Eastern District.
L if true of the Lake Erie District.
C if true of the Chicago District.
N if true of none.

You may use more than one letter if needed.

_____ 1. Ore boats can unload directly in the steel mill yards.
_____ 2. About a 500 mile rail haul needed for coal.
_____ 3. About a 100 mile rail haul needed for coal.
_____ 4. Farthest from its source of iron ore.
_____ 5. Market limited.
_____ 6. Cheap labor supply.
_____ 7. Early start, a great advantage.
_____ 8. Old equipment, a handicap.

———— 9. Coal right at hand.
———— 10. Iron ore right at hand.
———— 11. The Piedmont cotton mills an important market.
———— 12. The southern railways an important market.
———— 13. The automobile industry an important market.
———— 14. The Deering Harvester Works an important market.
———— 15. The Pullman Company an important market.
———— 16. The export trade important.

CAMPHOR: NATURAL AND SYNTHETIC

WARREN STRAIN
State Teachers College, Slippery Rock, Pennsylvania

Most people are familiar with the rollicking lilt about the man who was viciously attacked by a swarm of mosquitoes but who recovered after he had applied generous portions of camphorated ointment. From such references we have come to assume that most of this fragrant gum finds its way into medicines. That this assumption is prevalent may be proved by asking the "man on the street" to list the major uses of camphor. Actually no more than ten per cent of the camphor used in the United States goes into medicinal channels. What then are its most extensive uses?

USES OF CAMPHOR

It has been stated that it is easier to enumerate the things for which camphor is *not* used than to list the things for which it *is* used. While this statement is probably greatly exaggerated it does show that the uses are legion. In a recent issue of the trade journal, *Oil, Paint and Drug Reporter,* some twenty-eight different types of uses to which camphor is put, were listed. As one reads thru the list he understands what was meant by the statement at the beginning of this paragraph.

Approximately two-thirds of the camphor utilized in this country goes into the manufacture of pyroxylin plastics which are becoming increasingly popular. Ten per cent goes into the production of smokeless powder, while another ten per cent goes into pharmaceutical and medicinal products. The remaining fourteen per cent finds a wide variety of uses, the largest single item of which is in the manufacture of insecticides.

As a household necessity it has high priority. When undesirable

odors occur in the house from burned food, from the presence of mouldy or musty material in the basement, or from a rancid pipe or cigarette stubs, camphor is called to the rescue as a deodorant. If moths attack your clothes or termites start to eat away your home, camphor serves as a protector. A small lump of camphor gum greatly reduces tarnishing of silverware, and small quantities are used in furniture polish. In the preparation of toilet articles it finds its way into nail polish, into hair-washing and curling preparations, into dentifrices to make teeth sparkling and white, and into soap to give it a special cleansing power. Preparations designed to prevent the loss of the hair and those which are supposed to restore it on a bald pate, use camphor.

Every time we travel by car or bus, we employ camphor in several ways. An automobile trip is safer with the aid of this substance, for it is used in the manufacture of non-shatter glass with which cars are now equipped. When tires are treated with a camphor compound their life is greatly extended, and anti-knock gasoline kept in storage will deteriorate much more slowly when treated with camphor. A limited amount of this gum is used in preparations for the removal of carbon from your motor.

Finally, when you die, the embalming fluid used to prepare you for burial contains some of this versatile material. In India, many people keep it on hand to ward off evil spirits of the departed which the Hindus think might come back to molest them. Thus it may be seen that at home or on a trip, dead or alive, camphor plays an important role in the daily existence of all of us.

The Rise of Camphor Production

The first records of camphor production take us back to the fifteenth century when Chinese merchants visited the island of Formosa and there saw the natives producing a fragrant white oil which was later compressed into cakes. The oil was obtained by distilling chips of wood from the majestic and stately camphor trees which were native to the island. Because of the balmy odor emitted by these trees, the natives thought they were sacred and therefore used the distilled gum in their religious ceremonies. The fragrance of the gum appealed to the traders who took a small quantity back to China with them. Soon camphor became an item of commerce—not only between China and Formosa but also over the caravan routes to India and Europe. Within a short time the

island was annexed by the Chinese with the result that the camphor trade was developed greatly.

About 1850 two American merchants obtained a concession to handle all of the export trade in camphor from the island of Formosa. The port of Takao was dredged, a lighthouse was erected, and everything was in readiness. However, when the ships arrived the Chinese officials said that the head hunters in the hills had killed or frightened off all of the camphor gatherers and that it would be impossible to get a cargo, whereupon the crews of the American ships polished up their cannons and began a little target practice in the uncomfortably small harbor. Immediately seventy-eight boatloads of camphor came forth and thus began an important American trade in this product. So profitable was this business that Townshend Harris, our first ambassador to Japan, urged the United States to purchase the island from the Chinese but because of the impending Civil War in our country, the idea was never considered seriously. During the War Between the States the concession held by American merchants lapsed and was taken over by English traders.

At the close of the Sino-Japanese War in 1895, China ceded Formosa to the Japanese who placed the camphor industry under a strict government monopoly. The prospects for expanding the markets in this commodity were bright, for in 1885, just ten years before, John Hyatt, a young American printer, had discovered that by mixing camphor with nitrated cotton cellulose he would get celluloid—the first man-made plastic ever to be produced. For the next twenty-five years celluloid was a very popular commodity. Men wore collars made of this plastic—collars which had the striking advantage of being easily and quickly laundered. If they became soiled, a damp cloth wiped across them was all that was needed to clean them—no drying or ironing, yet they never looked crumpled. They could even be washed without taking them off. But the disadvantage of celluloid is the fact that it is highly inflammable; consequently if someone got too close with a lighted cigar or other fire, the wearer of such a collar might find his neck quickly encircled by flames. It is probable that it was during this period that the expression, "Don't get too hot under the collar," came into existence. As a safety measure it became illegal to manufacture celluloid neckwear. Now cellulose acetate has largely replaced nitrated cellulose in the manufacture of plastics, thus reducing the

fire hazard. However, nitrated cellulose is still used in photographic films.

Following the Russo-Japanese War, the Japanese needed a source of revenue to pay the war debt so they turned to the monopoly crop of Formosa—camphor. To manufacture this product, mature trees were cut, the logs chipped up, and the chips distilled. The Japanese Government realized that the island would eventually be deforested leading to a termination of the camphor industry unless a program of systematic reforestation was inaugurated. The magnitude of the plan adopted is revealed by the following figures which list the number of camphor trees planted in a four-year period: in 1906—346,000 trees; 1907—1,300,000 trees; 1908—4,820,000 trees and in 1909—5,060,184 trees.[1] A long range program is evident, for the trees of Formosa are not used in camphor production until they are at least fifty years old. This island is still the chief source of *natural* camphor altho synthetic production has definitely broken the monopoly once enjoyed by the Japanese.

EXPANSION THRU PLANTING

While Japan had a monopoly on camphor production, prices were kept at very high levels and shipments were uncertain. The price finally reached its maximum peak of $3.75 per pound in 1918 and in 1920 was still $3.55 per pound.[2] In 1944 the price was $0.44 per pound. As a consequence of the exorbitant prices, attempts were made to grow camphor trees in other parts of the world. A review of the literature between 1910 and 1920 reflects the optimism prevalent at that time about the new camphor groves. Tree planting projects were launched in Florida, Louisiana, Texas, and California. In 1913 American plastic manufacturers started a 12,000 acre camphor farm in northern Florida near Waller. The trees were planted in hedgerows about fifteen feet apart and camphor was to be made from the semi-annual clippings, for it had been proved by experiment that twigs and leaves could be used without the destruction of the trees themselves. Furthermore, it was estimated that such groves would yield up to $160 per acre each year. Another large planting was made near Satsuma along the St. Johns River.

That there was over-optimism is shown by the fact that there is

[1] Duncan, Robert, "Camphor: An Industry Revolutionized." *Harper's Magazine*, Vol. 122, pp. 380-386.

[2] Camphor in U.S.A., *The Du Pont Magazine*, March, 1941, p. 9.

no commercial production of camphor in Florida now. While the trees grow well thruout most of the state and are quite common as shade trees on lawns, the hazards of climatic irregularities, the high cost of handling, the hazards of tree diseases, and the attacks of insects, have all been responsible for the cessation of production. Mr. William Jacobs, Assistant State Forester of Florida, summarized the situation by saying that about the time these various camphor groves were of an age that their production might justify their existence, it was discovered that an even better grade of camphor could be made synthetically much more cheaply from the natural rosins of our southern pine trees. The same thing was true in Louisiana, Texas, and California. This definitely spelled the end of growing camphor trees as an industry in the United States.

Elsewhere in the world, plantations were started in Ceylon, Java, Egypt, Italy, Spain, and Australia with very discouraging results. The British attempted to develop the camphor industry on the island of Mauritius but the trees which were native to the island produced only camphor oil—not the solid gum. Even when young trees were imported from Formosa, fully ten per cent of them failed to produce solid gum. In spite of all the efforts to break the Japanese monopoly by planting camphor trees in other parts of the world, it was not until the product was made synthetically that the exclusive control passed from their hands.

Synthetic Camphor

It is safe to estimate that the synthetic camphor produced in this country accounted for well over half of our domestic consumption even before our entry into the war in 1941 and it is almost certain that the output has been stepped up since that time. Exact figures on production are not available because they would disclose the operations of individual companies and, of course, that is not permitted in government reports. In 1941, the only plant manufacturing synthetic camphor in this country was at Deepwater Point, New Jersey, on the Delaware River. Since this plant has a capacity of 4,500,000 pounds per year, it is doubtful if others will be needed for some time to come.

The basic raw materials used in the manufactural process are turpentine and hydrochloric gas. After the turpentine goes thru a special refining process it is sold under the trade name of pinene, one of the important sources of which is Pensacola, Florida. Here

the turpentine is extracted from pine stumps found in the nearby areas. At the camphor factory the pinene is started thru a long maze of pipes and enclosed tanks, hydrochloric gas being blended with it at various places along the line. The mixture is subjected to various heats and pressures so that sometimes it is a solid and at other times a liquid. After it has cooked for about four and one half hours it emerges at the other end of the pipe as camphor flakes which are packed in paper-lined barrels for shipment. The fact that the material is unseen and untouched from the time the pinene enters the pipes until it emerges as flakes, emphasizes the limited number of workmen needed. A small corps of technicians, who study the charts and occasionally operate the control valves, maintain the entire processing operations.

The location of the plant at Deepwater Point is significant. The turpentine from Pensacola and other seaboard cities of the South can be shipped by water to the factory's door. Its location just across the river from the extensive chemical works of Wilmington, Delaware, assures an easily obtainable supply of hydrochloric gas and technically skilled laborers. Finally, the factory is located near the center of the country's most important camphor consuming industries, the manufacturers of plastics.

The large-scale manufacture of synthetic camphor from turpentine is a relatively recent thing, beginning in 1933. Altho a similar attempt was made as early as 1900 by a firm at Niagara Falls, the venture failed—largely because of lack of technical skill which resulted in a very low yield of camphor per unit of turpentine. A second attempt (made during the first World War) by profiting from the earlier experiences, and by making use of added technical developments, netted a notably higher yield than did the first trial. However, within a short time the cost of turpentine took one of its upward surges and simultaneously the Japanese drastically reduced the price of natural camphor, thus making the operation of this plant no longer profitable. But with the rise of the plastic industries in the early 1930's it was again felt that this country should be independent of the Japanese monopoly and as a result synthetic camphor production was revived. Technical advances have given this last attempt a decided advantage over the two previous starts and the industry is now well entrenched. The production of this synthetic product has been a boon to both the producers of turpentine and to the manufacturers of plastics.

RECENT TRENDS

Recently there has been some publicity to revive the planting of camphor trees in this country as a source of natural camphor but this does not seem practical, since the synthetic product can be produced more cheaply. Then also, there are other plants, particularly annuals, which yield a large amount of camphor in one year at costs lower than production from camphor trees and which could be utilized in case of emergency. One of these plants, *Ocinum canum,* which is being investigated by the Bureau of Plant Industry in the Department of Agriculture has given rather encouraging results in the experimental stages and may be of importance as a supplement to the synthetic production, altho it is very doubtful if it will ever become our major source of camphor.

SHIFTING DESERT ECONOMIES

PFC. CHARLES W. JOHNSON

Most early desert living seems to have been based upon an animal economy existence. The nomadic herdsman or caravan operator could travel just as far as his four-footed animals were able to exist, based upon those animals' needs for water and food. Or the desert thief could plunder as long as his mount was fleet footed and enduring enough to elude pursuit. In any case, the desert occupant's standard of living was to a considerable extent based upon what was provided or made available by his animals. Such manner of living usually provided a most mobile desert occupance pattern as well as one having very "patchy" characteristics.

Exceptions to this "mobileness," and sometimes quite important exceptions, were to be found in the oases which varied in character from pinpoints in a landscape of barrenness, to lineal oases extending partly or entirely across the arid zone. Not only were these oases exceptions to the predominant occupance pattern (or rather perhaps lack of occupance pattern), but they also usually brought into existence at least the semblance of a plant economy. In exceptional cases where the oasis was large, this plant economy may even have become the primary economy within that oasis' own little sphere of influence.

Thus, it seems a fair inference that in historic times animal

control and dependence was of major significance in determining the occupance patterns of deserts. The needs of the domesticated animals—food, water, protection, care, and similar needs—were a primary determining factor in deciding the time and destinations of movements toward new living areas. Nor has this animal economy always been replaced by other economies in the modern era, altho in many cases at least the rudiments of other economies are appearing. The dependence on animals for living was not quite so complete in the case of the trans-desert caravan operator and trader, since some of his living necessities were frequently imported on the backs of his own beasts of burden. To an even lesser degree did an animal economy hold dictatorial sway over the living of oasis dwellers.

In desert living of today, the greater the degree that our mechanized civilization has encroached upon the desert the less is the degree of animal economy dominance. The secluded Gobi Desert, for example, has changed little from an early day animal economy. Meanwhile, American arid regions have undergone shifts: (1) toward plant economies with numerous artificially developed oases in addition to the original natural ones; (2) toward a manufacturing and mineral economy with great enlargements of desert extractive industries; (3) toward some phases of an economy of commerce with the building of many trans-desert transport facilities, i.e. highways, power lines, aqueducts, and air bases. The trans-desert railhighway and airline routes across the great desert of Australia not only are partially based upon a commercial economy but they have political and military aspects as well. The trans-Sahara railway, started thru French and German efforts, will do considerable to change original economies along its route when and if completed.

No longer are deserts to be considered entirely as backward and isolated zones of only one or two simple economies. As time passes and the latent potentialities of deserts are recognized, explored, and developed, the economies therein will become complex and superimposed. Witness for example, the present struggle for power in the arid Near-East regions. Is such induced by an extreme interest in the people there or in the utilization of their resources? Isn't it more probable that with world mineral deposits being rapidly utilized, this "superficial big-brotherliness" and interest in the people living there is at least partially fostered by

a striving for control of minerals found within their "lebensraum" —especially the oil boom of the present time? Here is a potential as well as a present example of a mineral extractive economy being pressed upon a people by world geopolitical turbulences, whether the natives there desire it or not.

A further example worthy of mention of a changing desert economy within the last century is found in the mineral extractive industries developed along the fringes of the Kalihara desert where diamonds and gold were and are mined. Even the "super-arid" Atacama Desert of Chile has considerable of mineral economy based upon the exploitation of its sodium nitrate deposits along with its iodine by-product. In fact, a study of almost any of the arid regions which are not too secluded (they'll become less and less so with the post-war network of airways) will reveal at least some encroachment of other economies upon the traditional old-world desert animal economy.

A considerable number of scientists have been working upon products to be made from various desert plants and resources. As such items are perfected and put into production even greater shifts will be made from the former usual single economy of the desert landscape. Perhaps it isn't on the excessively optimistic side to glimpse the prophecies of a recent newspaper article headlined "Cactus May Prove Desert's Pot of Gold." In the article a University of Oklahoma chemist mentioned how orchards of cacti in Mexico have been made to produce as much as nine tons of fruit per acre—fruit containing up to fourteen per cent sugar. He further stated that the mesquite fruit pod is richer in sugar than sugar cane or the sugar beet; that gum mesquite may replace gum arabic for pharmaceutical purposes; that yucca can be a source of soap as well as fiber; and that the jojoba produces a wax resembling whale oil. In fact, the list seems to be quite extensive for potential new uses of native desert plants with due consideration being given to the usual low productivity of the natural non-irrigated desert.

Further evidence of changing economies is to be found in the changes in occupations and modes of obtaining a living. By far the largest percentage of the historic old world desert occupants were nomads dependent upon animals. The few exceptions could usually be classified as occupations related to caravans or their stations, the infrequent trade centers, religious meccas, primitive

processing centers where animal and plant products were prepared before being shipped out, and oasis agriculture.

During the modern era the list of new occupations to be found in desert areas is proportionate to the extent that our mechanized and scientific civilization has invaded that particular area. The majority of these "new" occupations within the desert areas are not based upon an animal economy. Rather, these areas under modern influence may have a composite of several economies with an animal economy being distinctly of lesser importance.

The following list is presented as a mere sampling of the variety of the new and greatly enlarged types of occupations to be found on the desert landscape. The reader can make further additions, but from what is presented one should gain at least a glimpse of the transition and growing complexities of present desert economies.

Trans-desert transport occupations

Electrical power lines management and operation
Aqueduct and power pumping station management and upkeep
Mechanical replenishment, repair, and operational occupations for mechanized land and air transport
Refreshment and lodging occupations for above transport personnel as well as for those of other new desert occupations

Mineral occupations

Mineral prospectors and "wildcatters"
Mineral field operators
Mineral mine and field extractive specialists
Mineral refining specialists

Handcraft occupations

Mostly new and greatly enlarged production of desert novelties and curios for transient tourist sale as well as for shipment elsewhere (earlier products of handcraft occupations were usually of a practical use for the native)

Occupations connected with health and recreation meccas

Such occupations as those utilized in the operation of such establishments as Death Valley Scotty's Resort; also occupa-

tions dealing with the blossoming desert hospitalization centers for specialized treatments, etc.

In conclusion, might it not be wise to revise the popular picture of a singular or duo-desert economy pattern, that formerly applied to most deserts, along with our elimination of the movieland's romantic concept of deserts. Instead, replace these fantasies and obsolete interpretations of desert living with present-day realism, that the so-called "shrinking of the world" by air transport and other world modernizations has its repercussions upon desert zones as well as upon other climatic realms.

LEARNING THE LANGUAGE OF GEOGRAPHY

EDWARD J. RUTAN
College of Engineering, Newark, New Jersey

Practically everyone engaged in teaching geography would agree that one of the most persistent problems in teaching the subject is that of the language of geography; that is, the symbols employed to convey meaning. Words like "avigation," "global," "geopolitics," etc., are taking on new senses of meaning; while maps are undergoing changes of form and content. All this is confusing, particularly to the pupils. Consequently, new ways must be devised to enable them to learn the symbols of this language, which is just what this article attempts to do.

Since neither teachers nor pupils, as a whole, have traveled widely, books must be relied upon. Altho the motion picture does help to bring the world closer in that it shows people and places, yet all of this must of necessity be *interpreted*. Even with television this will still be true. Therefore, it is imperative that our pupils know how the symbols of language work. Above all, they must be made aware of the fact that a word, a picture, a map, etc., is but an approximation of the "thing itself"; that they must learn to disinguish between the verbal and the non-verbal; that there are objects (things) actions (operations), and concepts (ideas). Once the pupils grasp the fact that the *significance* is not the property of the *symbol* but merely an association with or a relation to actuality, they will attain not only a thoughtfulness but a carefulness that may very well last them for the rest of their lives.

One way of demonstrating the multiplicity of senses of meaning words can have is to use the same word to say something different each time it is used. For example, if the word were "earth," it could be dealt with as follows:

Earth

1. We live on the *earth*. (planet of mankind)
2. He gathered a handful of *earth*. (soil, dirt)
3. They own that plot of *earth*. (land, solid)
4. I fell to *earth* with a crash! (surface, ground)
5. The pirate planned to *earth* his treasure. (bury, hide)
6. The fox was run to *earth*. (his burrow or hole)
7. Why on *earth* did you do it? (for what reason)

Many more uses of the word could be added to the above list. but it will suffice to show the process of specifying each sense of a word. Other words in the language of geography which lend themselves to this important kind of inquiry are: age, bay, coast, degree, flood, gulf, heat, ice, key, long, mine, night, ocean, pole, race, sun, trade, unite, vein, water, zone, etc.

When words are explored in this particular manner, it is wise to point out that most words have a broad or general sense as contrasted with the more special senses they may acquire. Thus, "earth" may be all inclusive as a symbol for everything past, present and future, if we say: "The earth and all that is in it." But if we say, "The earth was used as a ground for the radio," the sense is sharply limited. And it is these differences in shades of meaning that pupils must be trained to see and to understand.

Another type of exercise is illustrated by the following examples:

Point out the differences in these expressions:

1. a road map
   an air map
   a world map

2. geology
   geography
   geopolitics

3. The Ice Age
   The Iron Age
   The Air Age

4. scale of miles
   scale of degrees
   scale of maps

5. the study of global geography
   the study of physical geography
   the study of political geography

A variation of this same kind of exercise is to present two or three pictures, maps, tables, charts, etc., of similar objects, territories, statistics, symbols,etc., and ask for as many explanations

of the differences as possible. This type of inquiry is bound to intensify investigation into the meanings of geographical data, for it is not just the similarities but the differences that pupils must be trained to note. In fact, too much emphasis is placed upon similarity rather than difference in the study of language, in spite of the fact that no two things are ever synonymous.

A further type of exercise is as follows:

Point out the difference between what A says and what B says.

1. A. The boundary was marked by the Ohio River.
   B. The frontier stretched to the Ohio River.
2. A. This is a mercator map.
   B. This is an azimuthal map.
3. A. He is a man of many resources.
   B. It is a country of many resources.
4. A. It is said to be the capital city of that country.
   B. He said that he believed in capital and labor.
5. A. We are now at the dawn of the Atomic Age.
   B. We are now at the beginning of the Air Age.

These exercises may be expanded so that two paragraphs, passages, chapters may be contrasted, provided that both deal with the same general topic or subject. Hence passages about the Arctic and the Antarctic areas could be used in this connection.

Finally this type of exercise could be used:

State completely the meaning behind each of the following:

1. Topography
2. Tables of contents
3. Science has changed man's thinking about the earth on which he lives.
4. Geography is the study of the earth and its products, of man and his industries, and of their influence upon each other.
5. Our century is not just an age of science, or an air age, or an atomic age, or just a period of transition, but a combination of all of these, including conflicting attitudes and ideas about how the world should be adapted to man's needs.

With this last kind of exercise, pupils should be encouraged to bring in references to substantiate their claims. All visual material should be utilized to the fullest. Anything that throws light upon the meaning behind the symbol is always worthwhile. Here, then, are some ways which may be adapted and used by teachers and pupils in learning the language of geography.

METEORS

PETER GREENLEAF
Eron Preparatory School, New York City

"From the outposts of the solar system rush the comets and as they blow up, their fragments leave trails. When one of these fragments falls it is as if a sample of the stuff out of which the universe was fashioned has been flung to the scientist. Take it, analyze it, Nature seems to cry. It's the stuff out of which far away stars, out of which remote Pluto and nearby Venus, were cast. It's iron, it's silicon. They are everywhere these bits of matter which are honeycombed by flame and which come a billion miles and contain the secret of the cosmos."

Stars seemed to rain from the heavens in the northern European skies in 1933 and from Siberia to Belgium people were amazed by the magnificent exhibition of "shooting stars" flashing across the sky at the rate of 100 per minute. Pulkova, a city near Leningrad, reported that the shower radiated from a point in Nu in the constellation of the Dragon, which lies in the northeastern sky. This display has no connection with Nu or the constellation of the Dragon. But, a shower of meteors must be located in some way and the best method is that of relating its radiant to some star in a particular constellation. A radiant is the point from which all the meteors seem to proceed.

The earth might be compared to a man in a mosquito infested swamp, so thick are the swarms of minute "earths" thru which it moves. Thus, as the earth plunges thru a swarm it captures some of these meteors. Only the earth's surrounding atmosphere protects the people living on it from destruction by the incessant pelting by the particles of matter ranging in size from that of birdshot to that compared in bulk to an ocean liner. "Shooting stars" do not shoot nor are they stars, it is the friction of our atmosphere with the meteors that makes them visible. They are ignited by rubbing against the air just as a match is ignited by rubbing it against sand paper. It is estimated that more than 24 million of these particles flash out their existence in the earth's atmosphere daily. Some of these have velocities from 26-100 miles per second. One of the great problems interplanetary machines will have to solve is how to maintain a defense against these billions of cosmic bullets traveling at these great speeds.

As the meteors enter the earth's atmosphere they must be at absolute zero temperatures —459.4°F, the temperature of outer space. Even tho their surfaces are heated rapidly by friction and may reach temperatures of several thousand degrees Fahrenheit, they reach the earth so rapidly (about 3 seconds) that their centers may be still at absolute zero.

One of the major theories as to the origin of meteors states that they are the scattered parts of comets. A comet is made up of numerous small particles held together by mutual attraction. The head (nucleus) of the comet contains the solid parts which become meteors. The remainder of the comet, mostly tail, is composed mainly of gas. Since the tail of a comet is formed by the repelling action of the sun, it always points away from the sun. There is the Perseid shower which is seen about August 11 and which Schiaparelli, who first discovered the canal-like markings on Mars, identified as the fragments of Tuttle's comet. These August meteors called the Perseids because they are located by the constellation Perseus cross the earth's orbit at a right angle. Biela's comet disintegrated and astronomers now speak of the Andromedids (Nov. 26) or the Bielids. The Leonids (Nov. 13) follow the tracks of Tempel's comet. Their orbit extends beyond Uranus and requires about 33 years for a complete revolution. These meteors seem to radiate from a point in the constelation Leo. The Aquarids (Eta in May 2 and Delta, July 28) are in the track of Halley's comet so that a connection between the two is obvious.

The only distinction between a meteorite and a meteor is that a meteorite is a meteor that has not been wholly consumed in its passage toward the earth and has struck the ground. Such a phenomenon was actually observed on June 20, 1908 in the province of Yenesei, Podkainmenaya Tunguska, Siberia. From more than four hundred miles people saw a huge ball of fire dart across the sky and, fortunately, strike an unpopulated region. (If the meteor had fallen six hours later it would have landed in densely populated Western Europe with a tremendous loss of life). At the nearest village some fifty miles away people were scorched by the heat and some houses were damaged. Within a circle many miles in diameter, trees were felled in concentric rows. The evidence is clear that a singeing wave of glowing gas preceded the meteor and blasted everything in its way. A Russian scientist, Kulik, located the place of the fall in 1927. He estimated that a 40,000 ton

meteorite must have struck the earth and that the concussion would have destroyed all life in an area of a few thousand square miles. Its effect was even greater than that of the Atomic Bomb on Hiroshima, which destroyed an area of three square miles.

Besides the pits left by the Siberian meteorite, there is a large crater, Canyon Diablo (Barringer Meteorite Pit) near Winslow, Arizona, which is 4,500 feet in diameter, rising 150 feet above the surrounding desert and dropping 600 feet to the floor. Geologic evidence places the age of the crater at 50,000 years. Professor F. R. Moulton estimates that to produce such a scar, a mass of 300,000 tons must have fallen and that the resulting explosion was equivalent to setting off 400,000,000 tons of T.N.T. There are also some recently discovered craters in Australia and Arabia, a small shallow pockmark in Ector County, Texas, and a group of pits on the island of Oesel, Estonia.

In the Carolinas, Professors F. A. Melton and W. Schriener believe they have discovered evidence of the most terrific of all encounters of meteorites and the earth. Scores of great splashes were produced, still visible in elliptical "bays" varying from a few feet to more than two miles in length. Bays with raised rims so formed, could be accounted for only by the impact of a cluster of meteorites from the nucleus of a comet 400 miles in diameter. But, at the present date no new evidence has been presented to substantiate their belief.

These intruders from space fall into three classifications:

1. Siderites which consist of iron mixed with 5 to 20% nickel. These are silvery under their blackened and pitted surfaces. The largest one is a 60 ton block found in South West Africa in 1921 and called the Hoba West. In 1938 at Goose Lake, Modoc County, California, was discovered a 2,573 pound siderite.

2. Siderolites are composed of 50% iron and 50% stone and are the most rare.

3. Aerolites are mostly stone and look like pieces of cement, with brown crusts and gray interiors. They are made up of silicon and magnesium oxide and some contain black diamonds, gold, platinum and even the spores of organisms. This brings up the conjecture that life may have originally come from some body in interstellar space.

There are many astronomers who hold that the craters of the moon are the results of batterings by meteorites and that our earth

has been saved from a great many scars because of its protecting atmosphere which the Moon lacks. Some astronomers even state that the inclination of the earth's axis was due to the jar caused by the impact of a tremendous meteorite.

It is even possible that at any moment a meteorite may fall and destroy millions of people but strangely enough there is no evidence of any person being killed by a meteorite.

EDITORIAL NOTES AND NEWS

Reports from a staff member of the Scripps Institution of Oceanography indicate that the derivation of products from seaweeds is being expanded in the United States. One of these products is agar. This is particularly useful in the preparation of bacteriological cultures, health foods, bakery products, and medicines. Other seaweed derivatives include algin used in ice cream manufacture, and carrageen or Irish Moss used in chocolate-milk preparations. A large supply of these products was formerly available from Japan.

According to a release from the office of the Assistant Chief of Air Staff, Intelligence, Washington, D.C., July, 1945, the cost of fuel in flying a Liberator from the Willow Run B-24 plant at Detroit to Prestwick, Scotland, was about $1,000. This cost is based on about 23 flying hours each of which required about 210 gallons of 100-130 octane gasoline at 23 cents a gallon. Statistical Control figures show that heavy bombers alone took one and a quarter billion gallons of gasoline during the three and a half years of war with Germany.

THE NATIONAL COUNCIL OF GEOGRAPHY TEACHERS

Report of Retiring President C. Langdon White

All the war years have been difficult years for the National Council of Geography Teachers. I have been president during only one of those years—1945. Shortly after becoming president, I was aware that the Council was not accomplishing what it should. I accordingly tried to put my finger on the principal vulnerable spots. To aid in this I wrote to each member of the Executive Committee asking for specific comments on (1) what was wrong with the Council and (2) what might be done to make the Council a more vital organization. Eight of the twelve members wrote and many suggestions were made that have proved helpful. I gave much thought to the various suggestions and recommendations. In the meantime, I was learning how very much work was entailed in the presidency; I realized also that there was even more work in the position of secretary. Yet the Council had no real funds for secretarial work for either officer. Moreover, much valuable time is lost in the cumbersome machinery of the Council. Too many persons must approve everything that has to be done and it is well nigh impossible to get replies from some members. I became convinced that the Council would remain largely impotent until such time as it could hire a paid full-time secretary—one who could and would take over much of the responsibility, one who would carry on from year to year, benefiting from the experience of continuous tenure. But immediately the practical problem of funds arose. After a meeting with Secretary Thomas Barton and Mr. E. L. Perkins of the A. J. Nystrom Company in the middle of June, I believed we had found a possible way of financing a secretary. We were assured of the necessary funds, *if* we could increase our membership to 12,000. At the meeting in Knoxville, I pressed this matter but the majority of the Executive Committee thought it would be impossible to increase membership to so great an extent. I believe that with an intensive state campaign, it could be done and I hope my successor, Mrs. K. T. Whittemore, will not let the matter of a paid secretary die.

The business transacted at Knoxville has been reported by Dr. Barton in the March issue of the JOURNAL and, hence, is not repeated here.

Since the same committees functioned in 1945 as did in 1944, it seems unwise to repeat in the limited space available in the JOURNAL OF GEOGRAPHY the identical report of my predecessor, Floyd Cunningham. Members who wish this material can find it by consulting Dr. Cunningham's report in the April issue of the JOURNAL OF GEOGRAPHY for 1945.

In closing, I wish to thank all officers and all committee chairmen and members for their cooperation.

THE NATIONAL COUNCIL AT WORK

The 1946 Convention

The 1946 annual meeting of the National Council will be held in Columbus, Ohio, on December 27 and 28. The Neil House will serve as headquarters. Those who are already planning to attend may reserve rooms at the Neil House by writing to Mr. V. C. Murphy, Manager. Rates are as follows: Room, 1 person, $4.40 and up; 2 persons (double bed), $5.00 and up; 2 persons (single beds), $5.50 and up; 3 persons (single beds), $7.50 and up; 4 persons (double beds), $9.50 and up.

A comprehensive and interesting program is being planned by the president and vice-president, Mrs. Whittemore and Dr. Meyer. Further details and the complete program will appear in Fall issues of the Journal. The annual banquet, to be held on December 27, will be followed by a reception honoring the recipients of the Distinguished Service Award. Miss Melvina Svec serves as chairman of the reception committee. Anyone wishing other information may write to the Secretary, who serves as chairman of arrangements for the Council.

Changes in Membership and Membership Dues

The Board of Directors of the National Council, voting by mail, approved several amendments to the constitution. General membership dues have been increased to $3.00 per year. In addition, contributing memberships have been established with dues of $10.00 per year, including the Journal of Geography. The dues of contributing members, or correspondence concerning such memberships should be sent to the *Secretary*.

Since a large part of the income from dues and royalties goes for the publication of the Journal of Geography and the cost of research projects, an increased income is needed for routine expenses and to finance the program of worthwhile activities now being planned.

Changes in Affiliated Organizations

Article II of the Constitution was changed to read as follows: "The object of the National Council of Geography Teachers shall be to increase the effectiveness of geography teaching in America (a) by promotion of national education movements; (b) by cooperating in the organization and development of state, regional, and sectional associations; (c) by encouraging the organization of local geography clubs and the affiliation of such clubs with state associations or the National Council; and (d) in such other ways as the officers may from time to time determine." This makes it possible for organizations other than state councils to affiliate with the National Council. For example, an affiliated council can cover a region larger or smaller than one state.

Officers of the Indiana Council

Following are the officers of our active Indiana Council:

President:	Mrs. Myrtle Shallenburg, 326 N.W. Fifth Street, Richmond
Vice-Presidents:	Dr. G. David Koch, Indiana State Teachers College, Terre Haute
	Mr. John C. Finney, 2920 Columbus Ave., Anderson
Secretary:	Miss Floy Hurlbut, Ball State Teachers College, Muncie
National Directors:	Dr. J. E. Switzer, University of Indiana, Bloomington
	Miss Floy Hurlbut, Ball State Teachers College, Muncie

Clyde F. Kohn, *Secretary*

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Mr. Barnes is Divisional Director of the Department of Social Studies, Detroit public schools, and Professor of Social Education, Wayne University. For many years he has been developing a highly successful geography program in the secondary schools of Detroit.

New American Bases in the Pacific. By O. W. Freeman 221

Dr. Freeman, who for three years served as Acting Professor of Geography at Indiana University, returned in September, 1946, to his position as Professor of Geography and Head, Department of Physical Science, Eastern Washington College of Education, Cheney, Washington. He is well known to JOURNAL readers by his frequent contributions.

Unit IV. The Pacific and Its Islands for Course in Global Geography. By Mary Viola Phillips 234

Miss Phillips is head of the high school department of geography, New Kensington, Pennsylvania, and a graduate of the University of Pittsburgh, where she is continuing her study for the doctorate. Her first paper appeared in September, 1945, and this is the fourth unit which she has developed.

The Plateau Indian of South America. By William H. Haas 243

Dr. Haas is Emeritus Professor of Geography, Northwestern University, and continuously active in research and in the field of educational geography. His latest book is The American Empire.

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The subscription price is $3.00 a year, payable in advance. The price of single copies is 35 cents. Postage prepaid on subscriptions from the United States, Canada, Canal Zone, Republic of Panama, Puerto Rico, Cuba, Virgin Islands of the United States, Dominican Republic, Philippines, Guam, Samoan Islands, Hawaii, Mexico, Costa Rica, Guatemala, Nicaragua, Republic of Honduras, Salvador, Argentina, Bolivia, Brazil, Colombia, Ecuador, Paraguay, Peru, Uruguay, Spain and Spanish Colonies. All other countries in the Postal Union add for postage 27¢ on annual subscriptions (total $3.27), on single copies 3¢ (total 38¢). All subscriptions are payable in United States Dollars.

***The Journal* is the official organ of the National Council of Geography Teachers and is sent to all members of the organization. The annual dues, $3.00, are payable to the *Journal of Geography*.** Extra postage rates for copies sent to foreign countries should be added to the membership dues.

Patrons are requested to make all remittances payable to the *Journal of Geography*, in postal or express money orders or bank drafts.

Members and subscribers who wish to continue receiving the *Journal* must send remittances promptly to assure the volume being complete.

Send manuscript and books for notice or review to the *Editor*.
Send orders for back numbers to *Journal of Geography*.

Published monthly except June, July and August

PUBLICATION OFFICES: 450-454 AHNAIP STREET, MENASHA, WISCONSIN

Business Correspondence, Membership Dues, and Subscriptions may be sent to Publication office or to

A. J. NYSTROM AND COMPANY
PUBLISHERS, JOURNAL OF GEOGRAPHY
3333 ELSTON AVENUE, CHICAGO 18

Entered as second-class matter January 15, 1919 at the post office of Menasha, Wisconsin, under the Act of March 3, 1879.